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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY, NEW SERIES, No. XVI.

Presented by B. L. Robinson, March 8, 1899. Received March 15, 1899.

I. — REVISION OF THE GENERA MONTANOA, PERYMENIUM, AND ZALUZANIA.

By B. L. Robinson and J. M. Greenman.

No considerable collection of Mexican or tropical American plants has been received at the Gray Herbarium in recent years, which has failed to contain one or more new or otherwise exceptionally interesting *Compositæ* of the subtribe *Verbesineæ*. The repeatedly experienced difficulty of properly placing such plants — due on the one hand to the imperfect characterization of many of the earlier described species, and on the other to the somewhat vague generic lines — has suggested the revisions here presented. While by no means exhaustive treatments, they correlate the hitherto scattered results of considerable recent work on this group, and furnish, in the light of the fuller material now available, a new critique upon many of the earlier species. Of the genera here treated, *Montanoa* has long been the most difficult, largely by reason of the brief and obscure descriptions of many species, chiefly those of Schultz Bipontinus, a writer whose long and intensive study of the *Compositæ* led him to a far more critical discrimination than intelligible description of species. Probably no one in recent years has given more attention to the work of Schultz than the late Dr. F. W. Klatt, who examined many of his types, and, when unable to secure duplicate specimens, recorded his observations by excellent sketches and notes. The recent acquisition of the Klatt collection of *Compositæ* by the Gray Herbarium has rendered it possible to interpret many of these doubtful plants with greater precision than could heretofore be effected on this side of the Atlantic. Others, however, are still obscure, and must remain so until their types can be examined in scattered European herbaria. Even when this can be accomplished, it is a question with how much practicality or justice such species, many of which are merely *nomina subnuda*, can be revived to displace fully and carefully characterized

species of later date. At all events, it is highly inexpedient to permit the existence of imperfectly described plants to block the advance of classification in the groups concerned, and, while anxious to give proper recognition to all the more careful work of Schultz and others, we have no hesitation in frankly relegating their less intelligible species, for the present, to that limbo of *dubiæ* which must long be appended to several of the larger genera of the *Verbesineæ*.

In citing specimens, literature, and synonymy, the writers have aimed to supplement rather than to repeat what can be readily found in the Synoptical Flora, Biologia Centrali-Americana, Flora Brasiliensis, or Index Kewensis. Species of which no specimens have been seen during these revisions are marked by an asterisk (*). The writers are grateful to Mr. F. V. Coville and Dr. J. N. Rose for the loan of the genus *Montanoa* from the U. S. National Museum, and to Miss Mary A. Day for the verification of references and other bibliographical assistance.

MONTANOA, Llav. & Lex. Heads (except in one species) heterogamous with neutral ligulate uniseriate ray-flowers and few to many perfect disk-flowers (the inner sometimes sterile). Involucre subcylindric to hemispherical, its bracts mostly narrow, 1–2-seriate, linear- to lance-oblong, rarely spatulate. Pales keeled, folded about the achenes, papery to subcartilaginous, attenuate or abruptly narrowed to an acute and often spinescent tip, persistent, accrescent, and more or less squarrose in fruit, always somewhat villous (densely so in the first subgenus), but sometimes quite glabrate; receptacle conical. Ligules spreading, usually oblong and emarginate at the end, without styles; achenes of the ray-flowers abortive, empty, pappusless. Disk-flowers regular, tubular, 5-toothed; proper tube slender, throat campanulate, and nerveless teeth ovate, acute. Style-branches slightly thickened upwards and appendaged with a short or slender acumination; achenes thickish, laterally compressed, relatively short, obovate; pappus none. — Pithy-stemmed shrubs, sometimes arborescent, with opposite serrate, dentate, or often lobed leaves, and white or purplish corymbose heads. — Nov. Veg. Desc. ii. 11 (1825); Sch. Bip. in Koch, Wochenschr. vii. 406–408; Benth. & Hook. f. Gen. ii. 364; Hemsl. Biol. Cent.-Am. Bot. ii. 164; Hoffm. in Engl. & Prantl, Nat. Pflanzenf. iv. Ab. 5, 232. *Eriocarpha*, Cass. Dict. Sci. Nat. lix. 236 (1829). *Eriocoma*, HBK. Nov. Gen. & Spec. iv. 267, t. 396 (1820). *Montagnæa*, DC. Prodr. v. 564 (1836). — An exclusively neontogenous and very natural group of 32 distinct species, extending from Northern Mexico to Panama, with outlying species as far

south as the Andes of Ecuador. Three natural subgenera are readily recognizable.

Subg. 1. ERIOCARPHA. Heads small, numerous, corymbose: ligules 2 to 5 or 0: pales conspicuously, densely, and permanently silky-villous, the spinescent tip mostly recurved in fruit: leaves various, 3-nerved. — *Eriocarpha*, Cass. l. c. *Montagnæa* § *Eriocarphæ*, DC. Prodr. v. 564. *Eriocoma*, HBK. Nov. Gen. & Spec. iv. 267. — Seven species, all Mexican.

* Ligules none: disk-flowers only 3 or 4.

1. M. anomala. Branches lignescent, pithy, obscurely 4-angled, striate, retaining only short and sparse remnants of a pubescence which in the early stages of growth is evidently copious and silvery: leaves opposite even up to the inflorescence, petiolate, the uppermost (the only ones known) suborbicular, broader than long, 4 cm. in length, 5 cm. in breadth, mucronulate-denticulate, not lobed, puberulent and scabrous above, rusty-tomentose beneath: panicle round-topped, 1.8 dm. broad; the branches and linear bractlets tomentose; heads crowded; involucral scales about 5, uniseriate, linear to linear-lanceolate, silky-villous on the outer surface: corollas densely pubescent except on the tube below. — *Montanoa* sp. Hemsl. Biol. Cent.-Am. Bot. ii. 166, where remarkable character is noted. — Collected by *Bourgeau* in the Valley of Cordova, Vera Cruz, Mexico, 16 March, 1866, no. 2057.

* * Ligules present, (2 to) 5; disk-flowers usually more numerous.

+ Bracts of the involucre, during anthesis, 2.5 to 4 mm. long.

++ Leaves ovate, ovate-deltoid, or lanceolate, sometimes crenate-toothed and hastate, but not otherwise lobed; petioles wingless.

= Leaves crenate-dentate, with base mostly obtuse, truncate, or cordate.

2. M. FLORIBUNDA, Sch. Bip. Branching shrub, 1.5 to 2.5 m. high: branches terete, striate, tomentose, at length glabrate: leaves all or nearly all opposite, ovate or more commonly deltoid-ovate, acute, rounded or more often truncate or broadly cordate at the base, shallowly crenate-dentate, 3 to 6 cm. long, often as broad, scabrous above, more or less sordid-tomentose beneath; petioles 1 to 2 cm. long, tomentose, usually naked, rarely appendaged near the leaf-blade: panicle corymbose, the branches slender, much exceeding the leafy bracts: disk-flowers about 15; ligules 5, from 5.5 to 7 mm. long. — Sch. Bip. in Koch, Wochenschr. vii. 406; Hemsl. Biol. Cent.-Am. Bot. ii. 165, in part (excl. pl. Bourgeau). *Eriocoma floribunda*, HBK. Nov. Gen. & Spec. iv. 268, t. 396. *Montagnæa floribunda*, DC. Prodr. v. 564. — Eastern-central and South-

ern Mexico, from 1,000 to 2,500 m. altitude; between Guadalupe and the city of Mexico, *Humboldt & Bonpland*, and at a neighboring station, *Schaffner;* Mountains of Oaxaca, *Galeotti*, no. 2008, *Pringle*, nos. 4969, 5651, *E. W. Nelson*, nos. 1544, 1920, *L. C. Smith*, no. 542, *González*, no. 46, *C. L. Smith*, no. 272.

3. M. TOMENTOSA, Llav. & Lex. In habit and floral characters very similar to the preceding: leaves decidedly longer than broad, conspicuously attenuate, often hastate, with a decided tendency towards coarse crenate dentation near the base, usually subcordate or cordate, scabrous above, canescent-tomentose beneath, 5 to 10 cm. long, 2 to 7 cm. broad; petioles often appendaged above. — Nov. Veg. Descr. ii. 11; Sch. Bip. l. c.; Hemsl. l. c. 166. *Montagnæa tomentosa*, DC. l. c. incl. var. *β cordifolia*. *Eriocoma heterophylla*, Schrad. Linnæa, x. Lit.-Ber. 70. *E. fragrans*, Sweet, Brit. Fl. Gard. ser. 2, t. 44. — State of Mexico, chiefly about the city, *La Llave, Bustamente & Rocha, Berlandier*, no. 574, *Schaffner*, no. 252, *Bourgeau*, nos. 501, 706, *Bilimek*, no. 25, *Pringle*, no. 3155; Morelos at Cuernavaca, *Bilimek*, no. 511; Puebla at Tehuacan, *Liebmann*, no. 262; San Luis Potosi, *Parry & Palmer*, no. 714, *Pringle*, no. 3307.

Var. TERNIFOLIA, Hemsl. Leaves ternate. — Hemsl. l. c. in syn. *M. ternifolia*, Sch. Bip. l. c. *Montagnæa tomentosa*, var. *ternifolia*, DC. l. c. 565. — Chopalopa, Mexico, *Berlandier*, no. 574, in part.

= = Leaves serrate, rhombic-ovate or lanceolate in outline, narrowed to a more or less cuneate base.

4. **M. Seleriana.** Shrub: branchlets terete, soon glabrous: leaves opposite, undivided, callous-serrulate or almost entire, tuberculate-scabrous above, canescent- or tawny-tomentose, at length subglabrate beneath, 5 to 10 cm. long, 2 to 7 cm. broad, 3–5-nerved above the cuneate base; petioles 1 cm. long: panicles rounded, 1 dm. broad; pedicels filiform, tawny-tomentulose: heads much as in the preceding species: ray-flowers 3 to 4; ligules 4 to 5 mm. long; disk-flowers about 9: fruit unknown. — Tuxtla, Chiapas, Mexico, *C. & E. Seler*, 19 February, 1896, nos. 1965, 1943.

+ + Leaves lanceolate, not lobed, conspicuously attenuate into winged petioles.

5. M. MICROCEPHALA, Sch. Bip. l. c. Rusty-tomentose: leaves elliptic-lanceolate, 6 cm. long including the winged petiole, 1.8 to 2 cm. broad, serrate, acute at each end, scabrous above, densely tomentose and minutely glandular beneath: heads very small, slender-pedicelled, numerous but not densely crowded. — Hemsl. l. c. 166; Klatt, Leopoldina,

xxiii. 90 (where the leaves are incorrectly described as glandular above). — Ejutla, Mexico, *Liebmann*, no. 483. Type in herb. Bot. Gard. Copenhagen; a fragment and good drawing in herb. Gray.

++ ++ ++ Leaves (rather large) decidedly lobed, more or less attenuate at the base.

6. **M. myriocephala.** Shrub, copiously branched: stems terete, pithy, at first tomentose, at length glabrate: leaves all opposite, petiolate, 8 to 14 cm. long, about half as broad, scabrous, and minutely tuberculate-puberulent above, thinly tomentose or at length glabrate beneath; lobes broad, the terminal one ovate, acuminate, the lateral single, broad and truncate or somewhat bifid, crenate-serrate or dentate; base of the blade at first abruptly then gradually narrowed and decurrent about half way down the petiole, the wings thus formed terminating rather abruptly and leaving the lower portion (1 to 4 cm.) of the petiole naked: heads very numerous, in open convex terminal corymbs; branches of the inflorescence usually exceeding the leaves; involucral scales 7, ovate-oblong, acute: ligules 6 to 7 mm. long, 4 mm. broad; disk-flowers about 9. — Jalisco, at Chapala, October–November, 1886, *Dr. Edward Palmer*, no. 714; Oaxaca, 9 km. above Dominguillo, altitude 1,380 to 1,690 m., 30 October, 1894, *E. W. Nelson*, no. 1854, below Jayacatlan, altitude 1,000 m., 19 October, 1895, *L. C. Smith*, no. 923; Puebla, between Petlacingo and Acatlan, altitude 1,070 m., 20 November, 1894, *E. W. Nelson*, no. 2000; Chiapas, between Hacienda Juncana and San Vicente, altitude 1,300 to 1,800 m., *E. W. Nelson*, no. 3503. Types in herb. Gray and herb. U. S. National Museum.

7. M. XANTHIIFOLIA, Sch. Bip. l. c. Similar to the preceding, the leaves of different contour, very scabrous above, 1.2 dm. long, 9 cm. broad, 3-lobed, cuneately narrowed into a stoutish rusty-tomentose petiole; the lobes upwardly directed, ovate or triangular, acute to caudate-acuminate, glandular-denticulate: disk-flowers about 10; ray-flowers 2 to 3; spinescent tip of the pales strongly reflexed in fruit. — Hemsl. l. c.; Klatt, l. c. & Bull. Soc. Bot. Belg. xxxi. pt. 1, 201. — Chacalepa Estate, Mexico, *Liebmann*, no. 265; also Rodeo, Costa Rica, altitude 750 m., *Pittier*. Type in herb. Bot. Gard. Copenhagen; a good drawing and fragments in herb. Gray.

+– +– Bracts of the involucre, during anthesis, 5 to 6 mm. long.

8. M. PALMERI, Fernald. Shrub: branches tomentulose above, but soon quite glabrate: leaves broadly ovate, more than half as wide as long, some of them strongly angled or shallowly lobed, caudate-acumi-

nate, crenulate, 1.4 dm. long; petioles 3 cm. long: heads in a loose leafy panicle. — Proc. Am. Acad. xxxiii. 93. — Hillsides near Acapulco, *Palmer*, no. 44. Type in herb. Gray.

9. M. Rosei, Robinson & Greenman. Similar to the last, but with lance-ovate serrate unlobed leaves, bullate above, green beneath, not half so broad as long: heads numerous, very silky, borne on filiform pedicels. — Proc. Am. Acad. xxxii. 45. *Montanoa* sp. Rose, Contrib. U. S. Nat. Herb. i. 103. — Alamos, W. Mexico, *Palmer*, no. 394, *Goldman*, no. 294. Type in herb. Gray.

Subg. 2. Acanthocarpha. Heads of medium size, less numerous: ligules 7 to 10: pales sub-glabrous or thinly villous, the spinescent tip straight or recurved. — *Montagnæa* § *Acanthocarphæ*, DC. l. c. 565. — Leaves ovate to lance-oblong, crenate, serrate, angled or palmately lobed, very rarely (*M. macrolepis*) pinnately lobed. Nineteen species of Mexico and Andean South America.

* Involucral bracts (1 cm. long) spatulate-obovate, considerably exceeding the disk-flowers.

10. **M. Pringlei.** Shrub: branches glabrate, covered with a rough gray cortex; branchlets pulverulent-tomentulose: leaves lanceolate or oblong-lanceolate, acute, serrate, 4 to 8 cm. long, 1.5 to 3 cm. broad, green and scabrous above, canescent-tomentose beneath, gradually narrowed into wings decurrent nearly to the base of the petiole: heads few, 2 or 3 at the ends of the branches, on slender erect peduncles (4 to 5 cm. long): ligules about 7, from 6 to 8 mm. long: pales (in anthesis) gradually attenuate, villous. — Calcareous hills near Tehuacan, Puebla, 28 July, 1897, *C. G. Pringle*, no. 7491. Well marked by its spatulate involucral bracts, which appear to be unique in the genus. Type in herb. Gray.

* * Involucral bracts broadly oblong, obtuse or rounded at the apex (7 to 10 mm. long, half as broad): leaves pinnately and sinuately 3(–5)-lobed.

11. M. macrolepis, Robinson & Greenman. Shrub, 1 to 2 m. high: heads few (1 to 5 at the ends of the branches), 1 to 2 cm. in diameter exclusive of rays, conspicuous and well marked in fruit by the elongated gradually attenuate straightish pungent stramineous ciliate but otherwise glabrate pales. — Proc. Am. Acad. xxxii. 44. — Oaxaca, Las Sedas, *Pringle*, no. 4932, Nacaltepec (Salomé), *L. C. Smith*, no. 818, 29 km. southwest of the city of Oaxaca, *E. W. Nelson*, no. 1375. Type in herb. Gray.

* * * Involucral bracts smaller and narrower, linear-oblong to linear.

+ Leaves oblong-lanceolate, subsessile or attenuate at the base to a winged or relatively short naked petiole: heads rather few, in leafy cymes or loose panicle.

12. M. SAMALENSIS, Coulter. Suffrutescent (?), "about 3 m. high," cymosely branched above, the branches sordid-tomentose, at length glabrescent: leaves crenate, deep green and more or less tuberculate, puberulent, and scabrous above, at first canescent-tomentose, at length green and glabrate beneath, 8 to 24 cm. long, a third as broad, passing without sharp demarcation into a short more or less winged petiole: peduncles axillary, 4 to 7 cm. long, simple or few-branched; involucral scales oblong, acutish, canescent-tomentose on the outer surface: rays about 10, from 1.2 to 1.5 cm. long: pales truncate, with spinescent mucro. — Bot. Gaz. xx. 49. — Guatemala, on the Rio Samalá, Depart. Retalhulen, altitude 500 m., *J. Donnell Smith*, no. 2858; also recently found in Zacatecas, Mexico, near Monte Escobedo, *Rose*, no. 2657, an interesting extension of range.

+ + Leaves sinuately and palmately 5(–7)-lobed, lobes acuminate; petioles auricled near the summit, otherwise wingless.

13. M. HIBISCIFOLIA, Benth. Leaves large, broadly cordate, 2 to 3 dm. broad, orbicular or reniform in general contour, sinuate-lobed nearly to the middle or sometimes much more deeply palmatifid; petioles enlarged and at first woolly toward the connate bases, bearing near the summit two oblong auricles: heads numerous in a corymb: ligules 8 to 10, 1 cm. long, white with roseate tinge: pales in fruit 1 cm. long, broad, emarginate, shortly mucronate. — Benth. acc. to Sch. Bip. in Koch, Wochenschr. vii. 407; Hemsl. l. c. 165; J. Donnell Smith, Enum. Pl. Guat. pt. 4, 85; Klatt, Bull. Soc. Bot. Belg. xxxi. pt. 1, 201. *Montagnæa hibiscifolia*, Benth. in Oerst. Vidensk. Meddel. 1852, p. 89. — Nicaragua, Segovia, *Oersted*, no. 235; Costa Rica, Volcan de Barba, *Oersted*, no. 134, thickets on the banks of the Rio Torres, *Tonduz*, no. 8478b; Guatemala, Depart. Santa Rosa, altitude 600–1,500 m., *Heyde & Lux*, nos. 3805, 6155, of Mr. J. Donnell Smith's sets; Chiapas, near Yajalon, *E. W. Nelson*, no. 3417.

+ + + Branchlets thick, more or less 4-angled: leaves large, suborbicular or polygonal, about as broad (9 to 17 cm.) as long; petioles not winged.

++ Leaves puberulent but not scabrous above.

14. M. QUADRANGULARIS, Sch. Bip. l. c. Glabrescent shrub: leaves large (1.5 dm. long, 1.7 dm. broad), thin, rounded throughout or obtusely 1-2-angled on either side, obtuse or broadly cordate and sometimes

slightly auricled at the base, little paler beneath, the margin essentially entire; petioles 4 to 10 cm. long: heads rather small, 8 mm. in diameter (excl. of ligules), on flexuous pubescent pedicels in a loose panicle: rays about 5, white, 7 mm. long. — Temperate regions on the Andes of Venezuela, Merida, *Moritz*, no. 1386; Quebrada near Quetame, U. S. Colombia, *André*, no. 862.

15. **M. guatemalensis.** Leaves subcoriaceous, wholly glabrate above, and canescent-tomentulose beneath, subentire, 1 dm. in breadth: heads larger, 1 cm. broad in anthesis; rays 1.5 cm. long: otherwise similar in most of its characters to the preceding species. — *M. patens*, Coulter in J. Donnell Smith, l. c., not Gray. — Guatemala on the Volcano Jumaytepeque, Depart. Santa Rosa, altitude 1,800 m., *Heyde & Lux*, December, 1892, no. 4216 of Mr. J. Donnell Smith's sets.

++ ++ Leaves scabrous above.

16. **M. hexagona.** A large tree: branchlets thick, strongly quadrangular, fulvous-tomentose above, at length glabrate: leaves hexagonal-ovate, distinctly and rather regularly serrate, about 1.4 dm. long, 1.3 dm. broad, acute or subacuminate, scabrous-puberulent above and arachnoid-tomentose beneath even in age, obtuse and unappendaged at the base; petioles thick, channelled above, wingless, tomentose, 7 cm. long: heads numerous and rather large in a very regular opposite-branched leafy-bracted panicle; pedicels 1.5 cm. long: involucral bracts lance-oblong, 2-seriate, acute, 3 to 4 mm. long: ligules 8 to 10, white, more than 2 cm. long: fruit unknown. — Temperate regions in the mountains of Chiapas, *Ghiesbreght*, no. 535; flowering in October. Type in herb. Gray.

+ + + + Leaves petioled, ovate or ovate-lanceolate, 4 to 7 cm. broad, crenate or serrate, or shallowly 1-lobed on either side.

++ Erect shrubs (at least showing in specimens no sign of climbing or trailing habit): leaves of membranous but of firm often harsh texture: peduncles erect or nearly so.

= Pales gradually narrowed to a long stout at length squarrosely spreading or recurved stramineous spinescent tip.

17. **M. FRUTESCENS**, Hemsl. Shrub, 3 m. high, with terete glabrous or early glabrate often purple branches: leaves ovate-lanceolate, serrate, caudate-acuminate, narrowed and unappendaged at the base, bright green and scabrous above, slightly paler and glabrate beneath: heads (not numerous) on stiffish peduncles; disk globose, in anthesis 1.3 cm. broad: rays about 8, 1 cm. long, white: pales nearly glabrous, accrescent, at length 1 to 2 cm. long, contorted and squarrose, thickish, firm and pun-

gent. — Biol. Cent.-Am. Bot. ii. 165. *Montagnæa frutescens*, Mairet in DC. Prodr. v. 565. *Aldama Montanoa*, Sch. Bip. in Koch, Wochenschr. vii. 406. — Mexico without locality, *Mairet*, *Bates* (1846); Valley of Mexico, *Berlandier*, no. 908, *Bourgeau*, nos. 592 (leaves sometimes 3-lobed), 966, *Pringle*, no. 7196; Michoacan, cool cañons near Patzcuaro, *Pringle*, nos. 4270, 5059.

18*. M. ARBORESCENS, Sch. Bip. l. c. 406. From description very near the preceding and differing chiefly in the inflexed points of its fruiting pales. — Hemsl. l. c. 164, only in part. *M. floribunda*, Cerv. and *Eriocoma arborescens*, Alam. acc. to DC. l. c. *Montagnæa arborescens*, DC. Prodr. v. 565. — Mexico without locality, *Alaman*, *Mairet*; Cordillera Guchilaqua, *Berlandier*, no. 1006.

= = Fruiting pales scarious-papery, rather abruptly contracted to a short more or less spreading point.

a. Leaves green beneath: Mexican.

19. **M. purpurascens.** Sordid-tomentose shrub: leaves ovate-rhombic or sometimes hastate, caudate-acuminate, crenate-serrate, more coarsely so toward the base, scabrous above, green but tomentose and often somewhat scabrous beneath, cordate to subcuneate and commonly biauriculate at the insertion of the petiole, 4 to 12 cm. long, 2 to 8 cm. broad; petioles tomentose, 1 to 2 cm. long: heads rather numerous in an open leafy-bracted corymb: rays 8 to 10, nearly 2 cm. long: fruiting pales turning purple, 1 cm. broad when flattened out. — *M. grandiflora*, Hemsl. l. c. 165, as to pl. Hartweg. *Montagnæa grandiflora*, Benth. Pl. Hartw. 19, not DC. — Aguas Calientes, *Hartweg*, no. 134; cañons and hills about Zacatecas, *Pringle*, nos. 2184, 3985, *Rose*, no. 3647; Guanajuato, *Guillemin-Tarayre*, *Dugès*, no. 456; Faval, *W. Schumann*, no. 115. Types in herb. Gray.

b. Leaves canescent-tomentose beneath: South American.

20. M. OVALIFOLIA, Sch. Bip. Shrub, 2 to 3 m. high, "subscandent," tomentose: leaves deltoid-ovate, 6 to 8 cm. long, three fourths as broad, permanently tomentose upon both surfaces, white beneath, serrate, acuminate: heads on tomentose peduncles (1.5 to 4 cm. long) few or more numerous and disposed in a regularly branched open panicle: rays about 10, from 1.8 to 2 cm. long: pales (still young) with a short sharp straight or often incurved point. — Sch. Bip. in Koch, Wochenschr. vii. 407. *Montagnæa ovalifolia*, DC. l. c. 566. ? *Verbesina atriplicifolia*, Juss. & Desf. in Colla, Hort. Rip. 144, t. 31 (but ray depicted as styliferous). *Montanoa atriplicifolia*, Klatt, Leopoldina, xxiii. 90, at least

in part, not however Sch. Bip. in Seem. Bot. Herald, 304. — Apparently common about Bogota, where coll. by *Funck & Schlim*, without number, *Holton*, no. 364; also in Ecuador at Chiquiribamba, altitude 3,000 m., *André*, no. 4444.

= = = Fruiting pales as in the last group but their points decidedly recurved and uncinate.

a. Leaves rarely lobed, tomentose beneath.

21. M. UNCINATA, Sch. Bip. l. c. 406. Shrub, 2 to 4 m. high: sordid- or canescent-tomentose upon the younger parts: leaves ovate-lanceolate, serrulate, undivided or sub-3-lobed, caudate-acuminate at the apex, narrowed to an inconspicuously or obsoletely biauriculate base; petioles tomentose, 2 to 3 cm. long: heads numerous in an open corymb: fruiting pales conduplicate, obovate, somewhat narrowed below, stramineous, passing at the summit into a small recurved point. — Hemsl. l. c. 166. — Mexico, Cumbre de Estepa, *Liebmann*, no. 484, also mountains of Oaxaca, *Pringle*, no. 4929, *E. W. Nelson*, nos. 1853, 1959, *C. & E. Seler*, no. 1512, *C. L. Smith*, no. 243. Type number in herb. Gray.

b. Leaves mostly angulate-lobed, pruinose-tomentulose beneath.

22. M. PATENS, Gray. Shrub, 2 to 4 m. high: branches pruinose-puberulent: leaves broad and distinctly 3(–5)-angled or -lobed, abruptly contracted to a biauriculate base, green and scabrous above, paler beneath, 1.2 to 2 dm. long, 7 to 14 cm. broad, apex and upper lobes acute, the lower angles mostly obtuse; petioles 2 to 3 cm. long: corymb 2 to 3 dm. broad; heads (incl. rays) 2 to 3 cm. broad; pedicels slender; pales much as in the preceding, at length very large, 1.1 cm. long; the wings with short rounded lateral lobe. — Proc. Am. Acad. xxi. 388. *M. atriplicifolia*, Sch. Bip. in Seem. Bot. Herald, 304, as to plant Seemann, but not as to synon. *M. arborescens*, Hemsl. l. c. 164, in part, not *Montagnæa arborescens*, DC. l. c. 565. — S. W. Chihuahua, *Palmer*, August to November, 1885, no. 164, *Goldman*, no. 216; Sonora, altitude 1,200 m., *Hartman*, no. 302; N. W. Mexico, *Seemann;* Alamos, *Palmer*, no. 361; Oaxaca at Jayacatlan, altitude 1,300 m., *L. C. Smith*, no. 266. Type in herb. Gray.

= = = = Fruiting pales retuse at the summit and tipped with a short straight mucro.

23. M. SUBTRUNCATA, Gray. Branches somewhat 4-angled; branchlets, pedicels, and petioles subglabrous: leaves ovate, serrate, acuminate, with or without one or two obtuse angles at the sides, truncate or broadly

subcordate at the exauriculate base: fruiting heads (1.4 cm. in diameter) considerably smaller than in the preceding related species. — Proc. Am. Acad. xxii. 424. — Jalisco on the Rio Blanco, *Palmer*, no. 599, near Guadalajara, *Pringle*, nos. 2467 (distr. as *M. patens*), 4545; at Balaños, *Rose*, no. 2939. Readily distinguished by the retuse pales.

++ ++ Climbing shrubs with slender terete stems, thinner more delicate leaves, and long slender and mostly hooked peduncles: clematoid plants of lower and more tropical regions than the preceding group: nearly related and imperfectly known species.

= Leaves large (1.2 dm. long), crenate-serrate, conspicuously appendaged at the base, obsoletely 3-lobed, caudate-acuminate, some of the upper ones usually alternate.

24. **M. Pittieri.** Branchlets green, in dried state striate, at first tomentulose, soon only puberulent or wholly glabrate: leaves ovate or somewhat rhombic in general contour, with a shoulder-like angle or short lobe on each side, appressed-puberulent not scabrous above, somewhat paler and soft-puberulent beneath, crenate-serrate with mucronulate teeth, rounded at the base but extended at the insertion of the petiole into a quadrate biauriculate appendage; petioles (2 to 3 cm. long) pubescent: peduncles alternate (4 cm. long), very flexuous and at length recurved: heads not numerous, in anthesis 1.1 to 1.2 cm. in diameter excl. rays; the latter about 8, white, 1.5 cm. long; involucral bracts about 6, lanceolate, acute, 4 mm. long; pales in young fruit papery, obovate, erose-dentate, tipped at the usually retuse summit with a short sharp incurved point. — *M. hibiscifolia*, Klatt, Bull. Soc. Bot. Belg. xxxi. 201, not Benth. — Costa Rica, in a hedge on the llanos of Alajuelita, *Pittier*, no. 1455.

= = Leaves smaller (4 to 9 cm. long), deltoid-ovate, acuminate, mostly opposite to the summit of the stem, serrate, undivided or somewhat 3-lobed, rounded, truncate, or subcordate at the base but often with a slight appendage or short acumination at the insertion of the petiole.

25. M. PAUCIFLORA, Klatt. Puberulent: leaves slightly scabrous above, regularly serrate, undivided and shallowly but acutely 3-lobed upon the same shoot; petioles 1 to 4 cm. long: heads few or many; involucral bracts oblong- or linear-lanceolate, 4 mm. long, pubescent: branches of the inflorescence opposite and divaricate, flexuous: ligules 1.3 to 1.5 cm. long. — Leopoldina, xxiii. 90. *Coreopsis trilobata*, Vahl in herb. acc. to Klatt, l. c. — South America without locality, "e pl. West." With Dr. Klatt's not over satisfactory type we should identify the following: J. Donnell Smith's no. 4242, coll. *Heyde & Lux* at

Casillas, Depart. Santa Rosa, Guatemala, altitude 1,200 m. and no. 5324 of the same set, coll. *Thieme* at San Pedro Sula, Honduras, altitude 250 m. In these plants, which are old enough to show immature fruit, the pales are not only retuse and mucronate at the apex, but have the wings more or less 2-lobed. Type in herb. Gray.

26. **M. Schottii.** Similar in habit: leaves ovate, unlobed, unappendaged, serrate, decidedly scabrous above, sordid-tomentulose beneath, 9 cm. long: heads decidedly larger than in the preceding species: involucral scales linear, acute, 7 mm. long, pubescent; ligules (about 10) 2.2 cm. long. —Yucatan, on a road between Merida and Sisal, *Dr. Arthur Schott*, 24 October, 1865, no. 913. Type in herb. Field Columbian Museum.

= = = Leaves similar in size and contour but dentate with more spreading teeth.

27. M. DUMICOLA, Klatt. Puberulent: leaves deltoid-ovate, unlobed, dentate rather than serrate, 5 to 6 cm. long, nearly as broad: heads in all observed characters identical with *M. pauciflora* described above. — Bull. Soc. Bot. Belg. xxxi. 200. — Costa Rica, in a hedge on llanos of Alajuelita, altitude 1,100 m., *Pittier*, no. 1454 (from the same locality as *M. Pittieri*, which differs much in the size, contour, and serration of its leaves). Type in herb. Gray.

= = = = Leaves ovate-lanceolate, rather gradually narrowed to an unappendaged base, serrate, about 5 cm. long.

28. M. GRACILIS, Sch. Bip. l. c. 407. Also near *M. pauciflora*, from which it differs solely, so far as can be learned, in its more lanceolate-ovate leaves, cuneately narrowed at the base, and in its less numerous ligules (5 in number). — Klatt, Leopoldina, xxiii. 91. — S. Miguel, La Grabra, *Liebmann*, no. 633. Type in herb. Bot. Gard. Copenhagen (?); a leaf and good sketch in herb. Gray. If Dr. Klatt is correct in stating the involucral bracts to be glabrous, the species is in this regard very different from the related members of the genus.

Subg. 3. UHDEA. Heads very large, 4.5 to 8 cm. in diameter incl. the 8 to 12 white or purplish rays: leaves large, sinuate-lobed, mostly pinnatifid. —*Uhdea*, Kunth, Ind. Sem. Hort. Berol. 1847, p. 13, & Ann. Sci. Nat. ser. 3, ix. (1848), 316. —Probably to be reduced to the following four species, all of Mexico.

* Petioles with broad undulate wings extending to the base; lobes of the leaves very unequal.

29. M. GRANDIFLORA, Sch. Bip. Tall shrub, 2 to 4 m. high: young branches canescent with minute pulverulent pubescence: leaves large,

3 dm. long including the petiole, scabrous above, at first canescent and velvety-tomentose but at length pale green and merely tomentulose beneath; lobes about 7, acuminate, serrate, the middle ones much larger than the others and again 2–4-lobed; winged petioles 6 to 8 cm. long, half as broad, flat, irregularly crenate-toothed, auriculate-amplexicaul at the base: heads numerous, showy: fruiting pales gradually narrowed to a point. — Sch. Bip. in Koch, Wochenschr. vii. 408; Hemsl. l. c. 165, only in part if at all. ? *M. mollissima*, Brongn. acc. to Groenland, Rev. Hort. ser. 4, vi. (1857), 543; Sch. Bip. in Koch, Wochenschr. vii. 408. *Montagnæa grandiflora*, DC. Prodr. v. 565. *Eriocoma grandiflora*, Alam. and ? *Priestleya longifolia*, Fl. Mex. Icon. acc. to DC. l. c. — Hills about Patzcuaro, Michoacan, *Pringle*, no. 3306; Guanajuato, *Dugès*, no. 456a. Originally collected in Mexico without locality by *Alaman*.

* * Petioles with wings narrow, irregular, incomplete, or none.

+– Leaves permanently canescent-tomentose beneath.

30. M. SPECIOSA, Sch. Bip. l. c. Wings of the petiole narrow, crisped, crenate-lobed: inflorescence a simple corymb, the primary branches 5 to 8 cm. long, 1-headed. — Hemsl. l. c. 166. — *Montagnæa speciosa*, DC. l. c. 565. — Cuernavaca, Morelos, *Berlandier*, no. 1057. Said (probably erroneously) to be herbaceous. Not secured by recent collectors. Type number in herb. Gray.

+– +– Leaves soon green and merely puberulent beneath.

31. M. PYRAMIDATA, Sch. Bip. l. c. 408. Erect shrub, 3 m. high, with pithy stems and obtusely 4-angled branches: leaves sinuate-pinnatifid with 7 to 9 oblong-lanceolate acuminate serrate very unequal lobes; intermediate lobes 2-cleft; petioles narrowly or obsoletely winged and bearing near the summit several rounded lobes, and at the base usually large foliaceous amplexicaul auricles: heads in a compound corymb; fruiting pales papery, obovate, subtruncate, with short delicate point. — Hemsl. l. c. 166. *M. grandiflora*, Hemsl. l. c. 165, in part, as to pl. Bourgeau. — Jalisco, Guadalajara, *Oliva*, *Palmer*, no. 492, *Pringle*, no. 2930; Morelos, at Cuernavaca, *Bourgeau*, no. 1199, *Pringle*, no. 7044; near the boundary of Oaxaca and Puebla, altitude 1,470 to 2,000 m., *E. W. Nelson*, no. 1984; Colima, *Palmer*, no. 1159 (coll. of 1891).

32. M. BIPINNATIFIDA, C. Koch. Similar to the preceding in most regards: lobes of the leaves 9 to 11, narrowly oblong, subequal, although the second and third pairs are 2–3-lobed; petioles channelled but not winged or appendaged except at the summit and base where provided with two or more small rounded or obtuse auricles: heads in a compound

corymb; pedicels 3 to 5 cm. long, tomentose; involucral scales lanceolate, externally tomentose, 8 to 10 mm. long: ligules about 12, oblong, cuneate at the base, 3 cm. long. — Wochenschr. vii. 407; Hemsl. l. c. 165. *M. heracleifolia*, Brongn. acc. to Groenland, Rev. Hort. ser. 4, vi. (1857), 544, nomen nudum. *Uhdea bipinnatifida*, Kunth, Ind. Sem. Hort. Berol. 1847, p. 13. *Polymnia grandis*, Hort. acc. to Kunth, l. c. *Montagnæa heracleifolia*, Brongn. acc. to André, Rev. Hort. 1863, p. 370 (where heads are said to be small and rays six). — Discovered (acc. to Koch, l. c.) by *Uhde* at Matamoras (Puebla?), Mexico, and sent to the Berlin Garden in 1845. Subsequently cultivated at various places, but apparently not secured by recent collectors in Mexico.

Doubtful or Transferred Species.

M. Aschenbornii, Sch. Bip. in Koch, Wochenschr. vii. 407, collected by Aschenborn in Mexico (?), is described merely as having deltoid-ovate serrate leaves pubescent only upon the nerves and larger veins beneath; the petioles thickened and pales straight. — Type in herb. Bot. Museum Berlin.

M. atriplicifolia, Klatt. See synon. of *M. ovalifolia*, Sch. Bip.

M. atriplicifolia, Sch. Bip. See synon. of *M. patens*, Gray.

M. clematidea, Hemsl. l. c. 165. See synon. of *M. Karwinskii*, Sch. Bip. below.

M. crenata, Sch. Bip. in Koch, Wochenschr. vii. 407, collected by de Berghes in Mexico without locality, is described as having stout petioles and ovate crenate leaves 7.7 cm. long and 2.8 cm. broad, 3-nerved from above the shortly cuneate base and tomentose beneath; the pales straight-pointed. — No plant satisfactorily corresponding to this species seems to have been secured in recent years.

M. elegans, C. Koch, Wochenschr. vii. 408, Hemsl. l. c. 165, of unknown country and characterized only as to leaf contour, must be most nearly related to if not identical with *M. pyramidata*, Sch. Bip., from which so far as known it differs only in the absence of the inconstant petiolar appendages.

M. heracleifolia, Brongn. See synon. of *M. bipinnatifida*, C. Koch.

M. heterophylla, Hemsl. Biol. Cent.-Am. Bot. ii. 166, in syn. is a clerical error for *Eriocoma heterophylla*, Schrad., which is *M. tomentosa*, Llav. & Lex.

M. Karwinskii, Sch. Bip. l. c. 407, as *Karwinskyi* (*Montagnæa Karvinskii*, DC. l. c. 565; also *M. clematidea*, Walp. Linnæa, xiv. 308,

& Rep. ii. 612, acc. to Sch. Bip. l. c., hence *Montanoa clematidea*, Hemsl. l. c. 165). Stem herbaceous (?), terete, subglabrate: leaves opposite, petiolate, ovate, obtusely sinuate, 3–5-nerved from the base, very sparsely pubescent: panicles lax, many-headed; involucral scales linear-lanceolate, acuminate, unequal: ligules 10, obovate-oblong, 1 to 1.2 cm. long, 4 to 6 mm. broad. — Mexico, without locality, *Karwinski*. The writers have seen no specimen of this species and fail to place it satisfactorily.

M. OLIVÆ, Sch. Bip. l. c. 406, is, according to the original brief characterization, distinguished by its small (3.5 cm. long) ovate serrate leaves (which on the lower surface have not only a soft pubescence but glands) and glabrous pales. — Guadalajara, *Dr. Oliva*, in 1855. We have seen no species of this nature, and as the region about Guadalajara has been repeatedly and thoroughly explored in recent years by Mr. Pringle and Dr. Palmer without bringing to light a *Montanoa* of this type it seems likely that the plant described by Schultz belonged to some other genus, as the glabrous pales would suggest.

M. ORBIGNYANA, Klatt, Abh. Naturf. Gesellsch. z. Halle, xv. 328, p. 8 of reprint, is *Hyptis crenata*, Pohl!

M. PURPUREA, Brongn. acc. to Groenland, Rev. Hort. ser. 4, vi. (1857), 544, and *Montagnæa purpurea*, Brongn. acc. to André, Rev. Hort. 1863, p. 370, are merely names.

M. THOMASII, Klatt, Abh. Naturf. Gesellsch. z. Halle, xv. (1882), 328, is *Gymnolomia patens*, Gray. The types of both species are in herb. Gray.

M. TRILOBA, Sch. Bip. in Koch, Wochenschr. vii. 406, is wholly dubious, resting upon a brief and very imperfect characterization based upon a specimen of unknown origin. It is said to resemble *M. xanthiifolia*, Sch. Bip., but to have 3–5-lobed leaves with soft pubescence.

MONTAGNÆA ENSIFOLIA, Sch. Bip. in Seem. Bot. Herald, 304, is *Gymnolomia ensifolia*, Benth. & Hook. f.

MONTAGNÆA HETEROPHYLLA, Walp. Rep. ii. 612, is *Montanoa tomentosa*, Llav. & Lex.

PERYMENIUM, Schrad. Heads (mostly small or of medium size) heterogamous; ray-flowers ligulate, styliferous, fertile; disk-flowers perfect, regular. Involucre hemispherical, campanulate or subcylindric, the bracts 1–4-seriate, appressed or squarrose, often ciliated. Pales carinate, folded about the achenes; receptacle convex. Disk-flowers with a rela-

tively short tube, rather long throat and 5 ovate teeth. Appendages of the style-branches short. Disk-achenes laterally compressed, the ray-achenes triangular, both wingless; pappus of several to many unequal awns; these sometimes slightly connate below. — Perennial herbs, undershrubs or tall shrubs, with opposite entire, serrate, or crenate (not lobed) 3-nerved usually scabrous leaves, and solitary to umbelliform-corymbose heads. Flowers yellow. — Ind. Sem. Hort. Gotting. 1830; Linnæa, vi. (1831), Lit.-Ber. 73; DC. Prodr. v. 608 (excl. synon. *Schistocarpha*); Benth & Hook. f. Gen. ii. 377; Hemsl. l. c. 180; Hoffm. in Engl. and Prantl, Nat. Pflanzenf. iv. Ab. 5, 236. — DeCandolle in 1836 enumerates 8 species, Bentham and Hooker in 1873 ascribe to the genus 10 species, Hemsley in 1881 enumerates 12 named species within the limits of the Biologia Centrali-Americana, and Hoffmann in 1890 places the species at 13, — a number which is just doubled in the present revision. The species are chiefly local, and are most numerous in Southern and Central Mexico. The genus as a whole ranges from Northern Mexico to the United States of Colombia.

§ 1. Scales of the involucre subequal, herbaceous, uniseriate or obscurely biseriate: heads few, long-peduncled from the ends of the branches; ligules 8 to 12, showy for the genus, 1 to 1.4 cm. in length: herbaceous or nearly so with several mostly decumbent stems from a thick lignescent root or stock.

* Involucral scales covered with a rather coarse somewhat spreading pubescence and often ciliate.

+– Involucral scales broad, ovate-oblong, obtuse or rounded at the apex.

1. P. TENELLUM, Gray. Stems prostrate, spreading, with numerous assurgent simple 1–2-headed branches: leaves oval or elliptical, obtuse, pubescent, crenate-serrate, rugose above, scarcely paler beneath, rounded at the base, 1.5 to 2 cm. long, 1.2 to 1.8 cm. broad; petioles coarsely pubescent, 3 mm. long: peduncles 3 to 8 cm. long; involucral scales about 10: rays about as many, elliptical, 1 cm. long, 5 to 6 cm. broad. — Proc. Am. Acad. xv. 36; Hemsl. Biol. Cent.-Am. Bot. ii. 182. — Mountains of San Luis Potosi, *Schaffner*, no. 302, *Parry & Palmer*, no. 450; also between Sta. Gertrudis and Sta. Teresa in the Sierra Madre of Tepic, *Rose*, nos. 2077, 3313; also a doubtful specimen from the Sierra of Guanajuato, altitude 2,000 m., *Guillemin-Tarayre*. Likely to be reduced to the following.

2*. P. BARCLAYANUM, DC. This species, said to be a subscandent undershrub, does not differ materially from the preceding in other described

characters. — Prodr. v. 608; Hemsl. Biol. Cent.-Am. Bot. ii. 180. — Characterized from a plant cultivated in Mexico. Not seen by the writers.

+ + Involucral scales narrower, ovate-lanceolate, acute or at least much narrowed to an obtuse tip.

3. P. BUPHTHALMOIDES, DC. Suffruticose: branches appressed-puberulent: leaves opposite, subsessile, elliptic-lanceolate, acuminate, 3–5-nerved at the base, coarsely serrate, sparingly puberulent above, puberulent especially upon the veins beneath; peduncles terminal, elongated, subsolitary: involucre campanulate; scales oblong-lanceolate, subacute, appressed-puberulent: rays 7 to 10, oblong, 1.5 cm. long, 4 to 5 mm. broad. — Prodr. v. 609 (whence descr. is compiled); Hemsl. l. c. 181. — Mexico, *Alaman*, acc. to DC. Having seen no authentic specimen of this species we have been obliged to interpret it from the description and from a careful drawing in the Klatt herbarium. To this species we refer Pringle's no. 7636, collected on the Serrania de Ajusco, in the Federal District, Mexico, altitude 3,000 m. Most of its leaves are acute but a few are acuminate and the pubescence of the involucral scales is not appressed.

4. P. Rosei. Stems from a lignescent base, erect or nearly so, 3 dm. high, covered with a coarse spreading pubescence: leaves ovate to oblong-lanceolate, coarsely and sharply serrate-dentate, acute, green and pubescent on both surfaces, 3–5-nerved from the rounded essentially sessile base, 3 to 4 cm. long, 1 to 1.5 cm. broad: peduncles mostly 2 or 3 at the ends of the branches, 5 to 8 cm. long, 1-headed; involucral scales about 10, oblong-lanceolate, acute, 8 mm. long: rays about 7, bright orange, elliptical, 1.3 cm. long, 9 mm. broad. — Road between Mesquites and Monte Escobedo, Jalisco, *Dr. J. N. Rose*, 26 August, 1897, no. 2608. Types in herb. U. S. Nat. Museum and herb. Gray.

* * Involucral scales minutely strigose with closely appressed hairs not ciliate.

5. P. CERVANTESII, DC. Stems numerous, decumbent, subsimple, appressed-puberulent: lowest leaves ovate, the others narrowly elliptic, strongly 3-nerved, regularly but rather finely and remotely serrate, scabrous-puberulent, acute, green on both sides: peduncles long, mostly solitary at the ends of the stems; involucral scales ovate-lanceolate, narrowed to an obtusish or acute tip: rays about 11, oblong, 1.5 cm. in length, 4 mm. in breadth. — Prodr. v. 609; Hemsl. Biol. Cent.-Am. Bot. ii. 181. — Valley of Mexico, Santa Fé, *Bourgeau*, no. 378, Flor de Maria, *Pringle*, no. 3169.

§ 2. Scales of the involucre decidedly unequal, imbricated in 2 to 4 rows, the outer shorter: mostly shrubs.

* Heads (seldom numerous) borne on long pedicels (6 to 10 cm. in length) or umbellately clustered at the summit of long nearly naked peduncles.

+– Perennial herb with short thick woody stock and fibrous roots: leaves conduplicate.

6. P. JALISCENSE, Robinson & Greenman. Scabrous-puberulent throughout: middle and upper leaves oblong or narrowly elliptic, regularly folded along the midnerve, recurved: involucral scales short, ovate, finely puberulent, obtuse, scarcely or not at all ciliate. — Am. Jour. Sci. ser. 3, l. 154. — Rocky Hills about Guadalajara, Jalisco, *Palmer*, no. 310, *Pringle*, no. 5426.

+– +– Perennial herb from a long stout root: rameal leaves small, elliptic-oblong, entire.

7. P. PARVIFOLIUM, Gray. Stems 3 dm. or more high, copiously branched: stem-leaves ovate, 2 to 4 cm. long; the rameal 7 to 12 mm. long, numerous: heads on relatively short erect pedicels umbellately clustered at the ends of long peduncles (1 to 1.5 dm. in length); involucral scales blunt, ciliate. — Proc. Am. Acad. xv. 36; Hemsl. l. c. 182. — Mountains of San Luis Potosi, *Schaffner*, no. 352, *Parry & Palmer*, no. 475; Durango, *Palmer*, no. 320 (coll. of 1896), *Nelson*, no. 4624.

+– +– +– Shrub: rameal leaves large, ovate, serrate.

8. P. subsquarrosum. Stems distinctly woody; branches opposite, scabrous-puberulent: leaves large, ovate, 7 cm. long, 3 to 3.5 cm. broad, serrate, acute, rounded at the base, green and scabrous-pubescent on both surfaces; petiole about 2 mm. long: heads 7 mm. broad (excl. of the rays), borne on long pedicels from the upper axils or on shorter pedicels in a pedunculate umbel; involucre campanulate, the scales with obtuse herbaceous tips tending to be squarrose: rays about 10, orange-yellow, brownish towards the base, 1.2 cm. long, 5 mm. broad: achenes of the disk-flowers slender, slightly constricted above. — Near Plateado, Zacatecas, *Dr. J. N. Rose*, 2 to 4 September, 1897, nos. 2751, 3649.

* * Heads usually numerous; pedicels and peduncles not greatly elongated, seldom exceeding 4 cm. in length. (Long peduncles or pedicels are occasionally found in *P. rude* and *P. pellitum*.)

+– Involucral scales acute or acuminate.

++ Leaves ovate, cordate, subcordate, or truncate at the base.

9. P. VERBESINOIDES, DC. Involucral scales ovate, acuminate, very unequal in length: rays about 10, linear-oblong. — Prodr. v. 608; Hemsl.

l. c. 182. — Mexico, *Berlandier*, acc. to DC. l. c. To this species we should refer Pringle's no. 6398 from hillsides about Cuernavaca, altitude 1,500 m. (a shrub 1.6 to 2.3 m. high); also an unnumbered specimen coll. by Bates in Mexico in 1846.

10. P. ASPERIFOLIUM, Sch. Bip. Involucral scales oblong-lanceolate, acute, not very unequal, coarsely pubescent: leaves tuberculate-pubescent and very scabrous above, copiously pubescent with softer hairs beneath: rays "about 16, oval." — Sch. Bip. in Klatt, Leopoldina, xxiii. 143. — Ejutla, Mexico, *Liebmann*, no. 568. Type in herb. Bot. Gard. Copenhagen; a fragment and good drawing in herb. Gray.

++ ++ Leaves lanceolate to lance-oblong, acute at the base.

11. **P. chalarolepis.** Shrub with slender quadrangular strigillose branches: leaves lanceolate, narrowly acuminate, 3-nerved from above the base, sharply serrate, finely pubescent and very scabrous upon both surfaces, 4 to 6 cm. long, a fourth as broad, scarcely paler beneath; petioles slender, 6 to 9 mm. long: heads many, small (6 mm. in diameter excl. of rays), borne in numerous open terminal 5-headed corymbs and not at all umbellate; involucral scales ovate, acuminate, with lax spreading tips, at length purplish: rays 6 to 9, oblong, 6 mm. long: anthers black. — Mountains of Chiapas, *Dr. Ghiesbreght*, 1864–1870, no. 563. Flowers in November. Type in herb. Gray.

12. **P. Ghiesbreghtii.** Shrub, 1 to 2 m. high: branches tetragonal, strigillose, soon glabrate: leaves lance-oblong, acute, serrate, 8 to 11 cm. long, 2 to 3 cm. broad, glabrate and smooth above, green and finely scabrous-pubescent beneath; petioles 5 mm. long: inflorescences (young) condensed and umbelliform: together forming a flat-topped corymb; involucral scales ovate, acute, minutely strigillose with white hairs: rays 7 to 8 mm. long. — Mountains of Chiapas, *Dr. Ghiesbreght*, 1864–1870, no. 576; also near San Cristobal in the same State, altitude 2,000 to 2,700 m., *E. W. Nelson*, no. 3205. Flowers in September and October. Type in herb. Gray.

+ + Involucral scales rounded or somewhat narrowed to an obtuse or obtusish tip.

++ Inner involucral scales 3 to 6 mm. long.

= Heads very small: involucre 3 mm. in diameter: scales ciliolate.

13. P. MICROCEPHALUM, Sch. Bip. Shrub: branches spreading, tetragonal, minutely strigillose, soon glabrate: leaves ovate-lanceolate, not exceeding 3 cm. in length, half as broad, slender-petioled, 3-nerved,

obscurely serrate, acute or acuminate: filiform pedicels 7 to 16 mm. long; heads numerous, in leafy-bracted corymbs, few-flowered: rays 5 to 8, oblong, 7 mm. long. — Sch. Bip. in Klatt, l. c. — Sta. Talca, *Liebmann*, no. 374; also near Totontepec, altitude 1,100 to 1,700 m., *E. W. Nelson*, no. 783. Type in herb. Bot. Gard. Copenhagen; a fragment in herb. Gray. Perhaps a form of the next.

14*. P. GRACILE, Hemsl. From description very like the last preceding but leaves said to be sometimes as much as 1 dm. in length (more than 3 times the size of any noted in *P. microcephalum*): pedicels 1.2 to 2.5 cm. long. — Biol. Cent.-Am. Bot. ii. 181. — San Cristobal, Orizaba, *Bourgeau*, no. 3206. Not seen by the writers. Type in herb. Kew.

= = Heads larger; involucral scales ciliate.

a. Leaves green and scarcely paler beneath, scabrous-pubescent upon both surfaces.

15. **P. Pringlei.** Shrub, scabrous throughout; branches and peduncles strigillose with minute appressed white hairs: leaves large (6 to 11 cm. long, 2 to 4 cm. broad), subentire to coarsely serrate-dentate, reticulate-veiny beneath; petioles 1 to 2 cm. long: pedicels filiform, subumbellate at the ends of the branches, 2 to 3 cm. long; involucral scales ovate to ovate-oblong: ligules about 8, pale yellow, 5 mm. long. — Slopes of cañons near Guadalajara, Jalisco, *C. G. Pringle*, 11 October, 1889, no. 2338 (distrib. as *P. Mendezii*?).

16. P. GYMNOLOMOIDES, DC. Shrub with tetragonal strigillose branchlets: leaves ovate-lanceolate, entire, attenuate, acute, rounded at the base, 5 cm. long, 1.5 to 1.7 cm. broad; petioles 3 mm. long: corymbs few(3–5)-headed; pubescence of the pedicels spreading; involucral scales broadly ovate, rounded at the ciliated summit: achenes narrowly or sometimes obsoletely winged, upwardly ciliated. — Prodr. v. 609; Klatt, Leopoldina, xx. 95. *Lipotriche gymnolomoides*, Less. Linnæa, vi. 408. — Mexico, Misantla, *Schiede & Deppe*, Mirador, *Sartorius;* Guatemala, in copses near Coban, Alta Vera Paz, *von Tuerckheim*, no. 339.

17. **P. rude.** Shrub, 1 to 2 m. high, scabrous throughout: leaves ovate, acutish, serrate, rounded or subcordate at the base, 2.5 to 3.7 cm. long, 1.5 to 2 cm. broad: heads corymbose or subumbellate by 3's or 5's at the summit of short or sometimes elongated peduncles; pubescence on pedicels strigose, appressed; involucral scales in 2 to 3 series, broadly ovate: ligules 8 to 10, oblong, bright orange, 7 to 9 mm. long — Hills of Oaxaca, at Las Sedas, *C. G. Pringle*, no. 4803 (distrib. as *P. gym-*

nolomoides), Huitzo, *L. C. Smith*, no. 218, Yalalag, *E. W. Nelson*, no. 954; also on the extinct volcano of Batea, *Guillemin-Tarayre*, and (?) rocky hills near Chihuahua, *Pringle*, no. 152 (distrib. as *P. parvifolium*).

b. Leaves ovate-oblong to lance-oblong, obscurely serrate to entire, distinctly paler and very finely pubescent or canescent-tomentulose beneath.

18. **P. croceum.** Copiously branched shrub; branchlets slender, tetragonal, scabrous: leaves ovate- to lance-oblong, acute to attenuate, 3-nerved, obsoletely serrate, rather abruptly narrowed at the base, 4 to 9 cm. long, 1.3 to 1.8 cm. broad, puberulent and scabrous above, very finely appressed-pubescent between as well as upon the veins beneath: heads numerous, showy, borne in the upper leaf-axils and subumbellate at the ends of the branches; pedicels 1.5 to 2 cm. long: involucral scales appressed, imbricated in 2 to 3 rows, unequal, the outer not only shorter but narrower, lanceolate, the inner ovate, rounded and ciliate at the summit: ligules about 7, oval, 8 to 10 mm. long, 6 mm. broad, yellow shading into deep orange towards the base. — State of Durango, *Dr. J. N. Rose*, no. 2321; also secured by the same collector between Pedro Paulo and San Blascito, Tepic, no. 1991. Types in herb. U. S. Nat. Museum and herb. Gray.

19. P. PELLITUM, Klatt. Leaves thinnish, ovate-lanceolate, attenuate, entire or nearly so, drying dark, the under surface covered with a very fine canescent tomentum: heads 3 to many at the ends of the branches; pedicels sometimes very short, sometimes much elongated. — Leopoldina, xxiii. 143. *P. discolor*, Sch. Bip. acc. to Klatt, l. c.; Hemsl. l. c., in part; not Schrad. — Mexico, Yavesia, *Liebmann*, no. 375; also mountains of Orizaba, *Thomas*, *Botteri*, no. 313, *Bourgeau*, no. 2927, *Seaton*, no. 125. Specimens from the Berlin Garden (1839) have elliptic obtuse crenate leaves.

20. P. DISCOLOR, Schrad. Shrub 3 to 5 m. high, very similar to the preceding species but with smaller thicker tomentulose leaves very rugose above, and not turning dark in drying: heads numerous; pedicels never much elongated. — Ind. Sem. Hort. Gotting. 1830; Linnæa, v. Lit.-Ber. 72; DC. Prodr. v. 608, excl. synon.; Hemsl. l. c. as to plants of Oaxaca. — Mountains and foothills of Oaxaca, *Andrieux*, no. 305, *Pringle*, no. 4650, *L. C. Smith*, nos. 129, 820.

= = = Heads as in the preceding group; involucral scales not ciliated.

a. Leaves linear-oblong, very small.

21. **P. microphyllum.** Shrub with slender terete smooth gray

opposite branches: leaves linear-oblong, entire, acute at each end, green on both sides, revolute at the margins, 3-nerved, thickish, scabrous, 1.4 to 1.7 cm. long, 2 to 4 mm. broad, puberulent under a lens: heads scattered, borne in the forks of the branches and terminally on short branchlets: pedicels about 7 mm. long, appressed gray-pubescent: scales of the involucre ovate, narrowed to an obtusish or sometimes expanded and obtuse tip: rays about 6, light yellow, oblong, 8 mm. in length. — Durango, Mexico, 13 August, 1897, *Dr. J. N. Rose*, no. 2252.

b. Leaves ovate.

22. P. MENDEZII, DC. Shrub, scabrous: leaves ovate-lanceolate, short-petioled, serrulate or nearly entire: heads numerous, on erect stiffish fastigiate pedicels: involucral scales in about 3 rows, the outer ovate, the inner oblong: rays "3 to 4" to 8. — Prodr. v. 608; Hemsl. l. c. 182. — South Mexico at Villalpanda, *Mendez*. Type in herb. DC.; fragment in herb. Gray. To this species may be referred E. W. Nelson's no. 3433 from Chiapas, and Pringle's no. 7610 from Hidalgo.

Var. **cylindrocephalum.** Leaves lanceolate: involucre more cylindrical; scales in 4 rows. — Mountain side near Cuernavaca, Morelos, altitute 2,500 m., *C. G. Pringle*, 22 May, 1898, no. 7658. Type in herb. Gray.

++ ++ Leaves and heads large, the latter rather crowded at the ends of the branches: inner scales of the involucre 8 to 12 mm. long.

= Pubescence on branches and petioles fine, appressed: petioles not over 1 cm. in length.

23. P. BERLANDIERI, DC. Leaves ovate, serrate or subentire, acute, rounded or scarcely cuneate at the base, 5 to 9 cm. long, obscurely pubescent: branchlets slender, nearly glabrous: rays 1 cm. long. — Prodr. v. 608; Hemsl. l. c. 181. — South Mexico, Guichilapa, *Berlandier*, no. 1040; also Valley of Mexico, *Bourgeau*, no. 964, and Mexico without locality, *Schmitz*.

24. P. **Klattii.** Tall shrub (4 m. high) with spreading branches; branchlets thickish, silky-pubescent with appressed hairs: leaves ovate-lanceolate, acuminate at each end, finely gray-pubescent on both surfaces, crenate-serrate or subentire, large for the genus, 1.5 to 1.9 dm. long, 6 to 7 cm. broad: scales of the large involucre very broad and rounded at the summit; rays 12, oblong-lanceolate, 1.8 cm. long. — *P. grande*, Klatt in Engl. Jahrb. viii. 43, not Hemsl. — On the Rio Risasalda, Cauca, U. S. Colombia, altitude 1,400 to 1,800 m., 24 November, 1883, *F. C. Lehmann*, no. 3282. Type in herb. Gray.

25. **P. Nelsonii.** Shrub with stout subterete branchlets, cinereous with copious short appressed or subappressed pubescence: leaves ovate, acuminate, serrate, thickish, finely scabrous-pubescent above, pubescent or almost tomentose beneath, rounded at the base, 6 to 10 cm. long, half as broad: heads large, showy, corymbose; pedicels subrigid, covered with grayish subappressed or strigillose pubescence; bracts linear; involucral scales oblong, rounded at the summit, ciliated: rays 8 or 10, oblong, orange-yellow, 1.5 cm. long. — Chiapas, Mexico, *E. W. Nelson* at two stations, namely, between San Cristobal and Teopisca, altitude 2,050 m. to 2,600 m., 4 December, 1895, no. 3465, and between Ocuilapa and Tuxtla, altitude 650 m. to 900 m., 29 August, 1895, no. 3076; also at Comitan, *C. & E. Seler*, no. 2970. Types in herb. Gray, herb. U. S. Nat. Museum, and herb. Berlin Museum.

= = Petioles 2 to 3 cm. long.

26. P. GRANDE, Hemsl. Shrub, hirsute throughout with spreading hairs: leaves ovate-oblong, crenate-serrate, nearly 2 dm. long, acuminate at the apex, acute but not attenuate at the base: rays 1.5 to 2 cm. long: involucral scales ovate, narrowed to an obtuse apex, pubescent and ciliate; heads numerous in an open corymb, showy: achenes frequently more or less winged. — Biol. Cent.-Am. Bot. ii. 181. *P. Tuerckheimii*, Klatt, Leopoldina, xx. 95. — Coban, Alta Vera Paz, Guatemala, altitude 1,300 m., *von Tuerckheim*, 1879 and 1886 (no. 336 of Mr. J. Donnell Smith's sets).

Var. strigillosa. Habit and all technical characters of the species, but pubescence of the stem and pedicels minute, appressed, strigillose. — *Zexmenia fasciculata*, Coulter in J. Donnell Smith, Enum. Pl. Guat. pt. 4, 86, not Gray. — Cenanguilla, Depart. Santa Rosa, Guatemala, altitude 1,200 m., *Heyde & Lux*, no. 4244 of Mr. J. Donnell Smith's sets. Type in herb. Gray.

EXCLUDED SPECIES.

P. ALBUM, Wats. Proc. Am. Acad. xxv. 154, is *Calea scabrifolia*, Benth. & Hook. f.

The Peruvian plant of Matthews, mentioned by Bentham and Hooker (Gen. ii. 377) as probably of this genus, has alternate leaves, sterile ray-flowers, and other essential characters of a *Viguiera*.

ZALUZANIA, Pers. Heads (medium-sized) heterogamous with obvious rays or in one species homogamous and discoid. Involucre hemispherical; bracts 1–3-seriate, linear to ovate, appressed, subequal. Receptacle conical; pales conduplicate: ray-flowers uniseriate, few to many, styliferous and fertile, rarely wanting: disk-flowers regular, perfect, fertile; the tube usually slender and pubescent, tending to expansion over the summit of the achene; the subcylindric throat of about equal length; limb of 5 ovate or triangular acute teeth. Anthers unappendaged at the base. Style-branches obtuse or with a short acute appendage. Achenes of the disk-flowers somewhat flattened; pappus none; achenes of the ray-flowers 3-gonal, sometimes crowned with a few deciduous scales. — Syn. ii. 473 (1807); DC. Prodr. v. 553; Benth. & Hook. f. Gen. ii. 362; Hoffm. in Engl. & Prantl, Nat. Pflanzenf. iv. Ab. 5, 233. *Chiliophyllum*, DC. l. c. 554. *Hybridella*, Cass. Dict. xxii. 86. *Ferdinanda*, Lag. Elench. 31. *Chrysophania*, Kunth in Less. Syn. Comp. 224. — Twelve species extending from Arizona to South Mexico and (?) Central America.

Subg. 1. HYBRIDELLA. Palustrine perennial herbs: leaves 3–4-pinnatifid: disk globose, large, 1.2 to 1.6 cm. in diameter; pales very narrow: rays oblong-linear, yellow, numerous (20 to 30), irregularly bifid at the apex. — *Hybridella*, Cass. Bull. Soc. Philom. 1817, p. 12, & Dict. xxii. 86. *Chiliophyllum*, DC. Prodr. v. 554.

1. Z. GLOBOSA, Sch. Bip. Decumbent, hirsute: stems 3 dm. high, bearing 3 to 5 leaves and about 6 long-peduncled heads: radical leaves several, 1 to 1.5 dm. long, 4-pinnatifid, the ultimate lobes lance-linear, acute, 2.5 to 3.5 mm. long: cauline leaves similar, oblong in general contour, the margined petioles copiously ciliate or even lanate near the base: involucral scales lanceolate, acute. — Flora, 1861, p. 564; Hemsl. Biol. Cent.-Am. Bot. ii. 159, excl. pl. Hartw. and syn. in part. *Anthemis globosa*, Ort. Dec. 46; Jacq. Hort. Schoenb. iii. t. 372 (cited in text as 371). *Chiliophyllum globosum*, DC. Prodr. v. 554. — Swamps, low meadows, &c., San Luis Potosi, *Parry & Palmer*, no. 527; Valley of Mexico, *Bourgeau*, no. 385, *Schaffner*, no. 80, *Pringle*, nos. 2925, 3204; Mexico, without locality, *Bates*, *Schmitz*, no. 46.

2. Z. MYRIOPHYLLA, Sch. Bip. l. c. 565. Identical in habit, pubescence, and floral characters with the preceding: leaves also oblong in contour, the cauline about 4; ultimate segments very small (2 mm. long or less, and 0.8 to 1 mm. wide), rounded at the apex. — *Z. globosa*, Hemsl. l. c. in part. — Aguas Calientes, *Hartweg*, no. 111. Type num-

ber in herb. Gray. Notwithstanding the general similarity subsisting between this species and the preceding, the difference in the size and form of the ultimate leaf-segments is sufficiently marked to warrant at least varietal distinction, and in the absence of any evidence of intergradation it seems best to maintain the species as proposed by Schultz. Schaffner's no. 345 from San Luis Potosi appears to be a glabrescent form of this species.

3. **Z. anthemidifolia.** Nearly glabrous except on the younger parts: stems decumbent: radical leaves unknown, the cauline numerous (12 to 22, the lower successively caducous), ovate and acute in general contour, 2–3-pinnate; ultimate segments obtuse or obtusish: peduncles 2 to 5 cm. long (shorter than in the related species); involucral scales puberulent, obtuse or obtusish. — Wet sandy river banks, Guadalajara, Jalisco, *Pringle*, 23 September, 1891, no. 5156. Type in herb. Gray. With heads and habit of *Z. globosa*, but a smooth stem and numerous cauline leaves of quite different contour and lobing.

Subg. 2. FERDINANDA. Plants of drier habitat: disk 7 to 12 mm. in diameter: rays 5 to 12 or none. — *Ferdinanda*, Lag. Elench. 31.

* Rays present.

+ Leaves sinuate-lobed.

++ Annual or biennial, usually pale with copious canescent or sordid pubescence: rays about 8, short, 6 to 8 mm. in length.

4. **Z. TRILOBA**, Pers. Stems 3 to 7 dm. high, branched above, canescent-tomentulose to hirsutulous or granular: leaves sinuately bipinnatifid with angular segments: heads rather numerous in terminal corymbs. — Syn. ii. 473; DC. Prodr. v. 553; Hemsl. l. c. ii. 160, iv. 55; Wats. Proc. Am. Acad. xviii. 105. *Z. trilobata*, Hoffmgg. Verz. Pfl. Nachtr. ii. 231, acc. to Hook. f. & Jacks. Ind. Kew. ii. 1245. *Anthemis sinuata*, Llav. & Lex. Nov. Veg. Descr. i. 30. *A. triloba*, Ort. Dec. 72. — A distinct and readily recognized species, apparently common from Coahuila, throughout Central Mexico to Orizaba.

++ ++ Perennial, green and smoothish; rays about 10, 2 cm. or more in length.

5. **Z. Grayana.** Suffruticose, 6 to 8 dm. high, from a branched lignescent stock surmounting a thick woody root: leaves ovate, petiolate, 3-lobed; lobes rather broad, unequally toothed: involucral scales linear, acute, canescent-pubescent: ray-flowers styliferous and fertile, their achenes provided with a short irregular deciduous scale-pappus. — *Gymnolomia triloba*, Gray, Proc. Am. Acad. xvii. 217, & Syn. Fl. i. pt. 2,

269, 450, not *Z. triloba*, Pers. — Higher peaks of S. Arizona, south of Rucker Valley, *Lemmon*, coll. of 1881, in Huachuca Mts., *Lemmon*, coll. of 1882, *Pringle* (small-leaved form); also in Chihuahua in shaded ravines and slopes of mountains, *Pringle*, nos. 755, 1310. The fertile rays in this species necessitate its transfer to this genus, with which in fact it corresponds habitally quite as well as with *Gymnolomia*.

+– +– Leaves crenate, serrate, or subentire, not lobed.

+– Leaves obtuse, pale above, canescent-tomentose beneath; blades rather abruptly contracted into winged petioles.

= Rays about 1 cm. long: involucral scales canescent-tomentose.

6. Z. MOLLISSIMA, Gray. Shrub: leaf-blade ovate, subentire: involucral scales (not very numerous) ovate-oblong, obtuse, white with permanent tomentum. — Proc. Am. Acad. xv. 35; Hemsl. Biol. Cent.-Am. Bot. ii. 160. — North Mexico, in fields near San Miguel, San Luis Potosi, *Schaffner*, no. 342; between San Antonio, Texas, and San Luis Potosi, *C. C. Parry*, nos. 35, 446; also on Mt. Orizaba, at 2,700 m. altitude, *Seaton*, no. 286.

= = Rays 5 to 7 mm. long: involucral scales puberulent, green.

7. Z. AUGUSTA, Sch. Bip. Shrub: leaf-blade ovate to lance-oblong, usually crenate: involucral scales numerous, lanceolate, the outer acute, subglabrate. — Flora, 1861, p. 562; Hemsl. l. c. 159 (excl. syn. *Z. megacephala*). *Ferdinanda augusta*, Lag. Gen. & Spec. Nov. 31, t. 2. *F. lutescens*, DC. Prodr. v. 553. *Anthemis lutescens*, Llav. & Lex. Nov. Veg. Descr. i. 30. *Chrysophania fastigiata*, Kunth, in Less. Syn. 224. — Apparently common in Central Mexico, near Guadelupe, *Bourgeau*, no. 803, *Bilimek*, no. 541; Chapultepec, *Bilimek*, no. 542; Rio Hondu Cañon, *Pringle*, no. 3144; Queretaro, *Berlandier*, no. 1254; near Guanajuato, *Dugès*.

+– +– Leaves acute, deltoid-ovate or -lanceolate, abruptly contracted to winged petioles.

8. Z. ASPERRIMA, Sch. Bip. Stem terete, glabrate: blade of lower leaves dentate, of the upper subentire, 5 cm. long, 3 cm. broad: fastigiately branched corymbose panicle leafy-bracted: heads (exclusive of the rays) ovoid-conical, 7 to 9 mm. in diameter: rays 8 to 10, broadly oblong, 5 mm. long. — Flora, 1864, 218. — Chapulco, *Liebmann*, no. 544. Type number in herb. Gray.

Var. montagnæfolia. Blades of even the upper leaves conspicuously crenate-dentate. — *Z. montagnæfolia*, Sch. Bip. l. c. 1861, p. 563;

Klatt, Leopoldina, xxiii. 89. *Ferdinanda montagnæfolia*, Sch. Bip. in Koch, Berl. Allgem. Gartenz. 1858, 179. — S. Mexico, between Vera Cruz and Orizaba, *Müller*; Ocotla, *Liebmann*, no. 272; also in Oaxaca near Monte Alban, altitude 1,600 m., *Pringle*, no. 4928 (distrib. as *Z. aspcrrima*).

++ ++ ++ Leaves acute, elliptic- or rhombic-ovate; petioles short or none.

= Base of corolla-tube expanded over the rounded summit of the achene.

9. Z. MEGACEPHALA, Sch. Bip. Leaves rhombic-ovate, serrulate above the middle, narrowed into an entire cuneate petiole, acute at the apex: corymb many-headed: heads the size of a filbert. — Flora, 1861, p. 562. *Ferdinanda augusta*, var. *megacephala*, Sch. Bip. fide ipsi l. c. 563. — Near Real del Monte, *Ehrenberg*, acc. to Sch. Bip. The above brief compiled character comprises all distinctions as yet published of this plant. Dr. Gray referred to the species a specimen collected by Dr. Palmer in the Sierra Madre, south of Saltillo, Coahuila, no. 734. It has an erect subsimple leafy puberulent stem, ovate acute thinnish leaves, 7 to 10 cm. long, 4 to 8 cm. broad, canescent beneath, serrulate except near the base where cuneately narrowed to very short scarcely winged petioles (4 to 7 mm. in length): heads in an irregular corymb; involucral scales narrow, oblong, obtusish, canescent-puberulent: ligules about 9, 8 mm. long. Mr. Pringle has also secured specimens of the same plant near Carneros Pass, Coahuila, altitude 3,000 m., no. 2398 (distrib. as *Z. Coulteri*).

10. Z. COULTERI, Hemsl. Stems puberulent, purple, leafy, simple to the leafy-bracted corymb: leaves ovate, serrate, pubescent above, tomentose beneath, rounded at the base, slightly acuminate at the insertion of the short petiole: involucral scales ovate-oblong, soft-pubescent. — Biol. Cent.-Am. Bot. ii. 159, t. 46. — Real del Monte, *Coulter*, no. 350; also collected by *C. G. Pringle* on the Sierra de Pachuca, Hidalgo, altitude 2,700 m., 13 August, 1898, no. 6956. Type number in herb. Gray.

= = Base of corolla-tube not perceptibly expanded: achene margined at the summit.

11. Z. RESINOSA, Watson. Stoutish, pubescent: leaves rhombic-ovate, very large, 1.4 to 2.6 dm. long, 8 to 14 cm. broad, dentate, green on both sides, bearing minute resinous globules beneath: heads short-peduncled in a loose irregular corymb; involucral scales numerous, the outer ovate-lanceolate, acutish, tomentose, the inner broader, rounded at the summit, striate, glabrate. — Proc. Am. Acad. xxv. 153. — Cañons of

the Sierra Madre, near Monterey, Nuevo Leon, *Pringle*, nos. 2222, 2412. Type in herb. Gray. This species is reported by Mr. J. Donnell Smith (Intercont. Ry. Comm. i. pt. 2, append. 3, 12) as collected at Calel, Guatemala, but from the extraordinary extension of range we are forced to doubt the identity of the Guatemalan plant (which we have not seen) with the North Mexican species.

* * Rays none.

12. Z. DISCOIDEA, Gray. Stem simple, erect, 7 dm. high, canescent-tomentulose: leaves round-ovate, crenate-dentate, scarcely acute, pale green above, white-tomentose beneath, 9 cm. long, 8 cm. broad, truncate or subcordate at the base but cuneate at the insertion of the petiole (1 to 1.4 cm. long): heads numerous, small, in a dense almost naked terminal corymb. — Proc. Am. Acad. xxi. 388. — Rocky hills near Chihuahua, *Pringle*, no. 309; along road between Cerro Prieto and La Providencia, State of Durango, 11 September, 1898, *E. W. Nelson*, no. 4970. Type in herb. Gray.

II. — SYNOPSIS OF THE GENUS VERBESINA, WITH AN ANALYTICAL KEY TO THE SPECIES.

By B. L. ROBINSON and J. M. GREENMAN.

THE genus *Verbesina* has not been revised as a whole since its treatment in the fifth volume of the Prodromus (1836). In this work DeCandolle describes 33 species with definiteness and appends 8 more indefinitely as "non satis notæ." All but 2 of these 41 species were American. DeCandolle divides the genus into three sections: *Verbesinaria* with radiate heads and straight pappus-awns, *Hamulium* with radiate heads and uncinate awns, and *Platypteris* with discoid heads. In 1883, Dr. Gray (Proc. Am. Acad. xix. 11–15) synopsized the North American, West Indian, and Mexican forms known to him, adding to the sections *Ximenesia* with loose herbaceous involucre, and *Pterophyton*, including a part of DeCandolle's *Verbesinaria* and most of the obscurely distinguished genus *Actinomeris*. From 1883 to 1889, Dr. Klatt (Leopoldina, xx.–xxv.) characterized many species and sought to disentangle the synonymy. In the second volume of Hemsley's Biologia